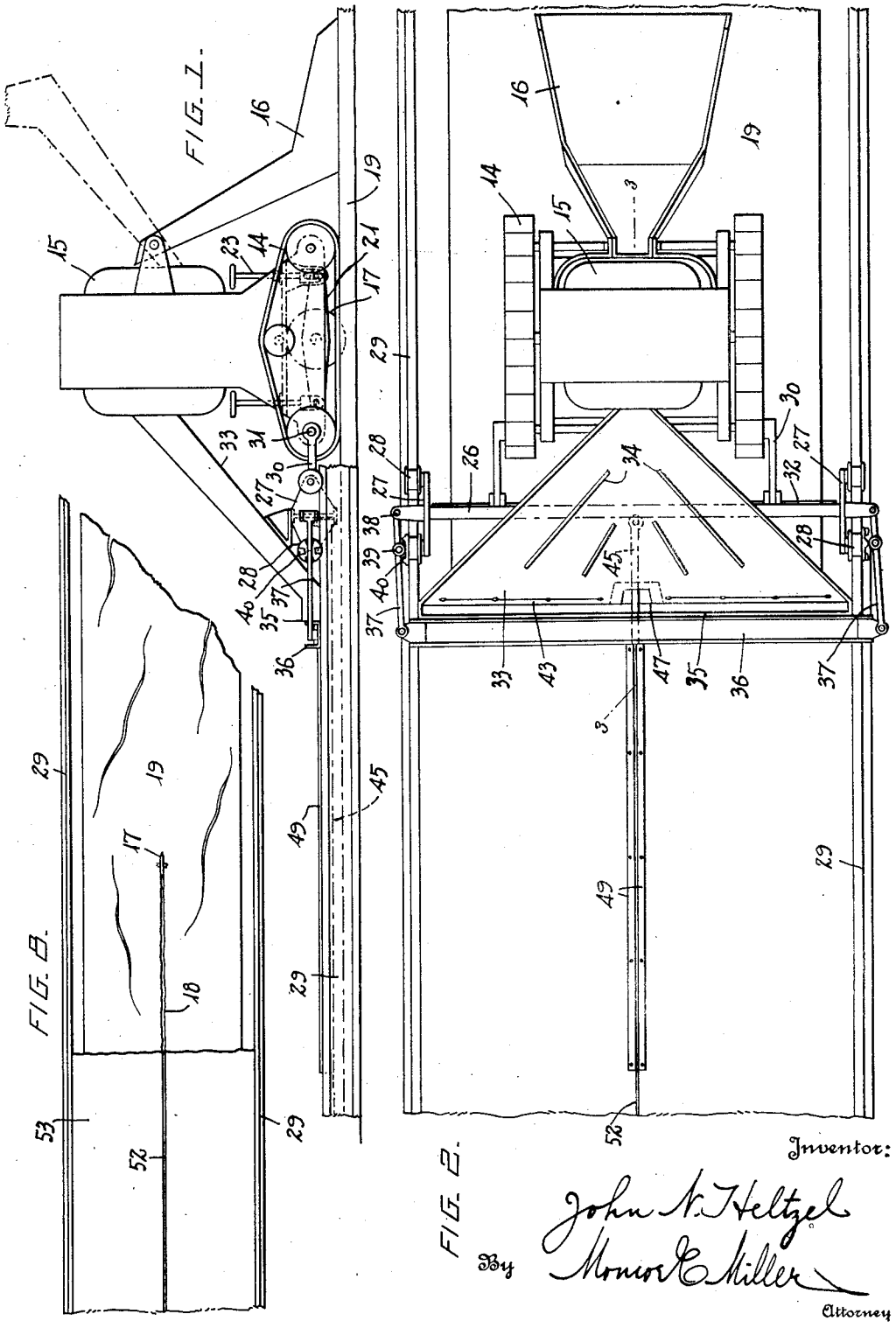
Jan. 31, 1933. J. N. HELTZEL 1,895,991

ROAD BUILDING MACHINE AND METHOD

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ROAD BUILDING MACHINE AND METHOD

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FIG. 3.

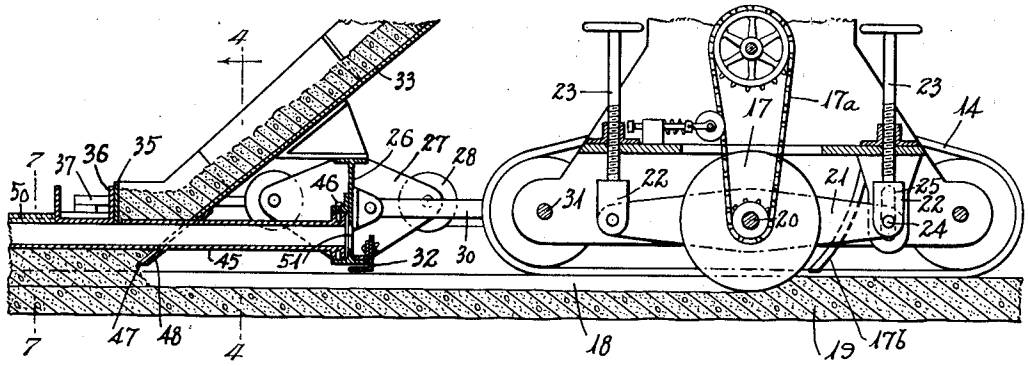



FIG. 4.

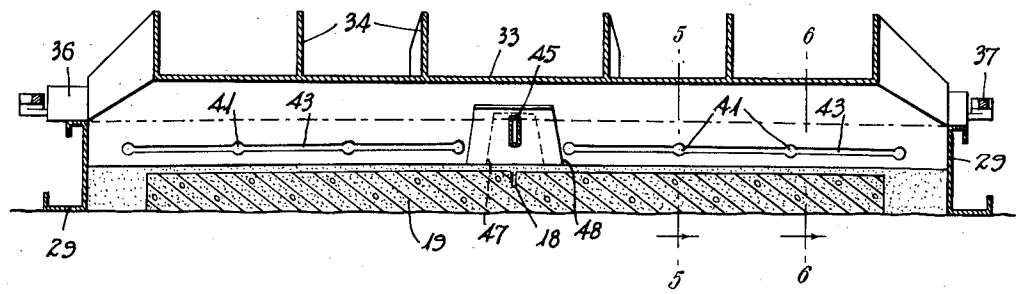



FIG. 5.

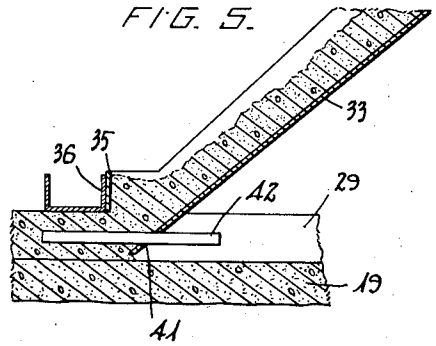



FIG. 6.

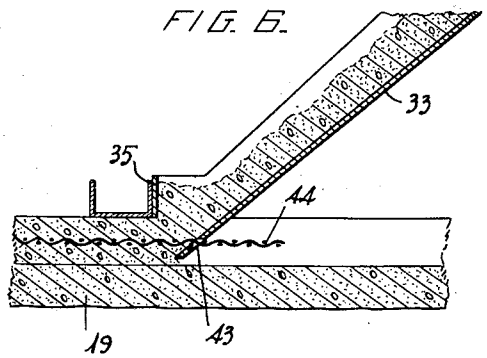



FIG. 9.

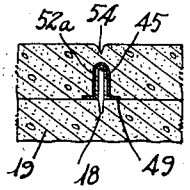
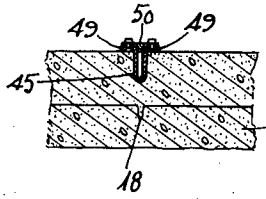



FIG. 7.




Inventor:

John N. Heltzel

By Monroe E. Miller

Attorney.

Patented Jan. 31, 1933 1,895,991

# UNITED STATES PATENT OFFICE

JOHN N. HELTZEL, OF WARREN, OHIO

## ROAD BUILDING MACHINE AND METHOD

Application filed November 26, 1927. Serial No. 235,977.

The present invention relates to the building of concrete roads, and aims to provide a novel and improved road building machine and method.

Another object of the invention is the provision of a road building apparatus including novel features of utility, including means trailing a concrete mixer for delivering the material to and spreading it across the road bed, means for striking off or screeding the surface of the plastic concrete, means for depositing or installing reinforcing or dowel rods and reinforcing mesh in the concrete, and novel means for producing a longitudinal joint or weakened line in the road to control longitudinal fracture.

A further object is the provision of a machine which is especially useful for rebuilding old or hard roads, and for cutting or splitting an old or hard road over which the concrete surface layer is built.

Concrete and other hard surface roads which were built a number of years ago at a time when hard surface roads were experimental require rebuilding sooner or later, and it is the practice in some instances to use the old road bed as a foundation for the new road which is built over the old road, some times called "double story" or "double deck" work. In recent years it has been determined that longitudinal center joints in the middle of the road are advisable to prevent the road slabs from breaking irregularly, such as occurs when the fractures are permitted to develop at random, and in order to control the longitudinal fracture of the new road it is necessary to cut or split the old road surface longitudinally below the longitudinal joint of the superimposed new road.

The present machine has provision for cutting or splitting the old or hard road and means for producing or developing a longitudinal joint in the new road over the split or cut in the old or hard road, in order to control the breaking of the road along the desired predetermined line. Otherwise, the natural irregular breaks of the old or hard road are apt to be reflected or induced through the concrete layer above the old or hard road.

With the foregoing and other objects in view, which will be apparent as the description proceeds, the invention resides in the construction and arrangement of parts, as hereinafter described and claimed, it being understood that changes can be made within the scope of what is claimed, without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawings, wherein—

Fig. 1 is a side elevation of the improved machine.

Fig. 2 is a plan view thereof.

Fig. 3 is an enlarged longitudinal section on the line 3—3 of Fig. 2.

Fig. 4 is a cross section on the line 4—4 of Fig. 3.

Fig. 5 is a sectional detail on the line 5—5 of Fig. 4, illustrating the depositing or installation of a reinforcing or dowel rod in the road.

Fig. 6 is a section on the line 6—6 of Fig. 4 illustrating the depositing or installation of reinforcing mesh in the road.

Fig. 7 is a sectional detail on the line 7—7 of Fig. 3.

Fig. 8 is a plan view illustrating the building of the new road over an old road.

Fig. 9 is a sectional detail corresponding with Fig. 7 and showing a modification.

A tractor 14 of any suitable kind is employed for carrying a concrete mixer 15 which has the skip 16 in front into which the sand, gravel, stones and cement are dumped to be delivered into the mixer. Any suitable tractor type of concrete mixer may be employed.

A heavy or rugged cutting or splitting disk 17 is carried by the tractor 14 for sawing or splitting, as at 18, the old hard road 19 on which the tractor travels. The saw or disk 17 is mounted for vertical adjustment, the axle 20 of said disk being carried by a longitudinal beam 21 having pivoted stirrups 22 at its ends in which the lower ends of vertical adjusting screws 23 are swivelled. Said screws are mounted in the frame of the tractor 14, and may be rotated for adjusting the forward and rear ends of the beam 21 vertically to regulate the depth of the cut made by the disk 17. The pivot 24 at the forward end of the beam 21 is preferably dis-

posed within a vertical slot 25 in the frame of the tractor in order that said beam is moved forwardly with the tractor, without subjecting the screws 23 to bending strain. The disk 17 is power driven by a sprocket chain 17*a* or other suitable gearing, and without having a toothed edge the friction thereof will enable the disk to saw into the concrete as the machine is advanced, with the disk rotating at a high speed. Sand, water or other material may be delivered in front of the disk through a spout 17*b* to supply abrasive to the disk and water may be supplied to cool the disk. It is possible to move the tractor by itself over the road for sawing a groove therein, previous to building the new road, and then when building the new road the disk 17 may be adjusted down further and permitted to idle so as to split the old road below the groove, the weight of the tractor and mixer exerting pressure on the disk to force it down into the concrete.

A transverse beam 26 is disposed in rear of the tractor and its ends are secured to carriers 27 that have wheels 28 movable on the side rails or forms 29 that define the sides of the new road under construction. Said rails 29 are spaced from the edges of the old road, as seen in Figs. 4 and 8, it being the usual practice to make the new road wider than the old one. The beam 26 is connected by links or draw bars 30 with the tractor 14, such as the rear axle 31, in order that said beam and other parts connected thereto will be pulled forwardly with the tractor.

A sub-grader or spreader 32 is adjustably mounted on the beam 26 and may be employed for preparing the sub-grade for the new road. Thus, the member 32 may serve to spread sand and gravel placed on the old road, for filling depressions and cavities. A scarifier may also be used in lieu of the member 32 for cutting the surface of the old road for better adhesion thereto of the concrete layer laid thereon.

The material from the concrete mixer 15 is discharged down a chute 33 which is supported by and extends downwardly and rearwardly to a point in rear of the beam 26. Said chute increases in width rearwardly and its rear end is of a width coinciding with the width of the new road under construction. Deflectors 34 are provided in the chute for deflecting the material so as to spread it throughout the width of the road in passing to the rear end of the chute. The rear end of the chute has a rigid strikeoff or screed 35 formed to conform to the crown of the new road, and under which the plastic concrete passes from the chute, thereby giving the surface of the new road its desired crown.

Immediately behind the rigid screed 35 is a reciprocatory screed or strikeoff 36 which extends across and rests on the rails 29. The screed 36 is also of a form to conform to the desired surface or crown of the road. Levers 37 are connected to the opposite ends of the screed 36 and are pivoted, as at 38, to the carriers 27, and the rear wheels 28 have cams 40 to contact with rollers 39 on said levers, whereby the rotation of said wheels in the forward travel of the tractor will oscillate the levers 37 and reciprocate the screed 36 on the surface of the plastic concrete behind the rigid screed 35.

The chute or spreader 33 has apertures 41 therein near its lower rear edge and below the surface of the road under construction, in order that reinforcing or dowel rods 42 may be inserted through said apertures. Said rods may be inserted rearwardly from in front of the chute through the apertures 41 into the soft material below the screeds, and it is thus possible to readily deposit or install reinforcing and dowel rods in the road. When the chute 33 moves forwardly it will move along the rods 42 which remain in place so as to be deposited in the concrete below the surface thereof.

The chute 33 also has slots 43 near its lower rear edge, through which reinforcing mesh 44 may be inserted to be deposited or installed in the concrete below the surface thereof, similar to the reinforcing rods 42. As shown, the slots 43 intersect the apertures 41 and are located at opposite sides of the longitudinal center line of the road where the longitudinal joint is produced.

It is thus a convenient matter to deposit or install reinforcing and dowel rods and reinforcing mesh in the road during the formation thereof.

The longitudinal joint producing means comprises a longitudinal blade or tail member 45, the forward end of which is hingedly connected, as at 46, with the beam 26, so that said blade is drawn forwardly with the tractor. The blade 45 is hollow or tubular, and as shown its opening is elongated vertically, although the blade 45 may be of any suitable cross-section. The blade 45 extends through an opening 47 in the chute 33, and a plate 48 secured on the blade closes said opening, thereby permitting the blade 45 to oscillate transversely. The blade 45 is closed at the top within the chute, and is open at the top in rear of the chute, said blade having upper flanges 49 in rear of the screeds to move on the concrete at the opposite sides of the blade. In order to close the slot of the blade in rear of the screeds a cover plate or strip 50 is detachably secured on the flanges 49, as seen in Figs. 3 and 7. The chute 33 delivers the material over the blade 45, and the screeds 35 and 36 extend over said blade. The beam 26 has an opening 51 registering with the forward end of the blade 45 for the insertion of a paper, metal or composition strip rearwardly into the blade to be deposited in the concrete.

In building the new road the tractor 14 travels on the old road, and it is preferable to provide a chalk line on the old road along which the cutting disk 17 moves. The concrete delivered from the mixer 15 passes down the spreader chute 33 and is deposited over the old road between the rails 39, the screed 35 "molding" the surface of the road and the screed 36 being reciprocated in rear will complete the screeding action. As the road progresses, reinforcing or dowel rods 42 and reinforcing mesh 44 may be introduced rearwardly through the apertures 41 and slots 43 so as to be properly embedded in the road. The blade 45 being drawn forwardly will provide a groove or weakened line in the upper or new layer immediately above the cut or split 18 formed in the old road or layer. Any suitable material may be delivered from the blade 45 into the concrete to produce the joint, such as a strip of paper, composition, metal, or the like, delivered rearwardly through the blade 45 from the forward end thereof and emerging from the rear end of the blade, as at 52. When the strip 52 passes rearwardly through the blade, it is preferable to secure the cap or cover strip 50 on the blade. Short lengths of paper, metal, composition or other strips may be placed in the blade 45 between the flanges 49, when the cap strip 50 is removed, so that the strips may be deposited in the blade in rear of the screeds to be deposited in the concrete. It is also possible to deliver plastic material into the blade to flow from the rear end thereof for producing the longitudinal joint. The blade 45 extends forwardly beyond the loose material in front of the screeds and within the lower portion of the chute, thereby requiring minimum power to advance the blade 45, same being merely pulled forwardly with only skin friction. The nozzle of the chute 33, including the screed 35, extends the full width of the road, and serves to grade or surface the road, and the blade 45 extends rearwardly through said chute nozzle from in front thereof.—The sub-grader or spreader 32 will spread the sand and gravel over the old road 19 in rear of the tractor 14, so as to provide a smooth cushion over which the new road is built.

The present machine, as will be apparent, may also be employed for the building of new roads over the usual dirt sub-base, and is not limited to the rebuilding of old roads although it has special provisions for such rebuilding operation.

With reference to the longitudinal joint blade 45 this application is a continuation of application Serial No. 223,161, filed September 30, 1927.

As shown in Fig. 9, the blade 45 is inverted and disposed lower down so as to move on the old road 19 immediately over the groove 18. As shown, a doubled sheet or strip 52*a* is placed over the blade 45 to be deposited in the upper layer of concrete, although a strip or other material may be delivered through the blade 45. The joint strip or material is thus deposited in the upper layer below the upper surface thereof and immediately above the groove 18, and it is preferable to form a groove 54 in the upper surface of the upper layer above the joint member embedded in the concrete, so that the upper layer will break between the groove 45 and joint strip. The flanges 49 of the blade or member 45 are adapted to move on the old road or lower layer 19, and will also prevent the blade from rising. When building a road directly on a sub-base, the blade or member 45 may move on the sub-base.

The apparatus and method may also be employed with equal propriety and success for cutting a slot in a lower hardened layer or base of a road and for producing an upper layer thereon.

Having thus described the invention, what is claimed as new is:—

1. The method of rebuilding a road consisting in producing a cut in a hard road, placing a layer of concrete over said hard road, and producing a weakened portion in said layer above said cut.

2. The method of rebuilding a road consisting in producing a longitudinal cut in a hard road, placing a layer of concrete on the hard road, and producing a longitudinal joint in said layer above said cut.

3. A road building machine comprising means movable on a hard road for producing a cut therein, and means trailing said means for producing, in a layer of concrete on the hard road, a weakened portion above said cut.

4. A road building machine comprising a tractor movable on hard road and having means for producing a longitudinal cut in said road, and means trailing said tractor for producing, in a layer of concrete on the hard road, a longitudinal joint above said cut.

5. A road building machine having a concrete spreader chute, and a joint producing member extending rearwardly from within the delivery portion of said chute.

6. A road building machine having a concrete spreader chute, a joint producing member extending rearwardly from within the delivery portion of said chute, and screeding means operable over said member.

7. A road building machine comprising means movable on a hard road for producing a cut therein, means following said means for depositing a layer of plastic concrete on the hard road over said cut, and means following in rear of the secondnamed means for producing a weakened portion in the layer of plastic concrete above said cut.

8. A road building machine comprising means movable on a hard road for producing a cut therein, means following said means for depositing a layer of plastic concrete on the hard road over said cut, and means following in rear of the secondnamed means for producing a longitudinal joint in said layer of concrete above said cut.

9. The method of building a concrete road with a joint therein consisting in moving a member in the plastic concrete along the line of the joint to produce a separation in the concrete, and depositing joint producing material downwardly into said member to be deposited in said separation.

10. The method of building a concrete road with a joint therein consisting in moving a member having an open upper edge portion along the line of the joint in the plastic concrete of a road under construction, to produce a separation therein, and depositing joint strips downwardly in said member as said member is advanced, to place said strips in said separation.

11. A road building machine including a member adapted to move in the plastic concrete of a road under construction along the line of a joint, said member being open at the top to receive joint producing material deposited downwardly into the separation of the concrete produced by said member.

12. A road building machine including an elongated member adapted to be moved in the plastic concrete of a road under construction along the line of a joint for producing a separation in the concrete, and having an open upper edge portion to receive joint strips deposited downwardly in said separation.

13. A road building machine including an elongated member to move in the plastic concrete of a road under construction along the line of a joint for producing a separation in the concrete and having an open upper edge portion to receive joint material deposited downwardly in said separation, said member having an open forward end for the rearward passage of joint material through said member, and means for closing said open edge portion.

14. A road building machine including an elongated member to move in the plastic concrete of a road under construction along the line of a joint for producing a separation in the concrete and having an open upper edge portion to receive joint material deposited downwardly in said separation, said member having an open forward end for the rearward passage of joint material through said member, and a cover strip detachably secured on said member to close said open edge portion.

15. A road building machine having a concrete spreader chute extending downwardly below the surface of the road under construction, said chute having an opening below said surface adapted for the rearward insertion of reinforcing elements into the plastic concrete in rear of the chute.

16. A road building machine having a concrete spreader chute for spreading a layer of plastic concrete over a road bed, said chute extending downwardly below the surface of the road under construction, and screeding means operable on the plastic concrete in rear of said chute, said chute having provision below said surface for the rearward insertion of reinforcing elements into the plastic concrete to a point below said screeding means.

17. The method of installing a joint in a concrete road consisting in positioning a member longitudinally of the line of the joint, depositing joint producing material downwardly at least partly below the surface of the concrete while guided by said member, and moving said member longitudinally along the line of the joint while in contact with the material.

18. The method of installing a joint in a concrete road consisting in positioning a member having an open upper edge portion along the line of the joint, depositing joint producing material downwardly in said member, and moving said member longitudinally of said line while in contact with said material.

19. The method of installing a joint in a concrete road consisting in positioning a member along the line of the joint, depositing a joint strip downwardly while guided by said member, and moving said member longitudinally along said line while in contact with said strip.

20. The method of installing a joint concrete road consisting in positioning a slotted member having an open upper edge portion along the line of the joint, depositing a joint strip downwardly in said member at least partly below the surface of the concrete, and moving said member longitudinally along said line while in contact with said strip.

21. A road building machine including a joint installing member, and means for mounting same for movement longitudinally along the line of a joint, said member being adapted for guiding joint producing material downwardly to be deposited in the concrete and being movable longitudinally along said line while in contact with said material.

22. A road building machine comprising an elongated slotted member and means for mounting same for movement longitudinally of the line of a joint, said member being adapted for the downward insertion of joint producing material in the slot thereof to be deposited in the concrete along said line and said member being movable longitudinally

along said line while in contact with said material.

23. A road building machine comprising a tractor having a cutting disk for producing a cut in a hard road, and means following said disk for producing, in a layer of concrete on the hard road, a weakened portion above said cut.

24. A road building machine comprising a tractor, a cutting disk underneath the tractor for cutting a hard road, means for adjustably supporting said disk from the tractor, and means following said disk for producing, in a layer of concrete on the hard road, a weakened portion above said cut.

25. A road building machine, comprising a tractor, a high speed friction disk, means adjustably supporting said disk from the tractor, means for rotating said disk whereby to make a cut in a hard road, and a device following said disk for producing, in a layer of concrete on the hard road, a weakened portion above said cut.

In testimony whereof I hereunto affix my signature.

JOHN N. HELTZEL.